

REMARKS

In the Office Action mailed February 3, 2003, Claims 1-20 are rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claims 1-20 are rejected under 35 U.S.C. § 103(a) for obviousness over Geiger et al., "Influence of Sulphur on the Formation of Dioxin/Furan during Sewage Sludge Incineration (English Translation)" in view of U.S. Patent No. 6,436,868 to Imai et al. and further in view of Japanese patent document 11-33343. Claims 1-20 are also rejected under 35 U.S.C. § 103(a) as being obvious over Geiger et al. in view of Imai and further in view of Japanese patent document 05-031323.

I. Rejections under 35 U.S.C. § 112

Claims 1-20 stand rejected under 35 U.S.C. § 112 as being indefinite. Claims 1 and 15 have been amended to recite process steps. Claim 13 has been amended to provide antecedent basis for the recitation of chlorinated solvents. For these reasons, the rejection of Claims 1-20 is believed to have been overcome and the reversal of the rejection of Claims 1-20 for indefiniteness is respectfully requested.

II. Rejections under 35 U.S.C. § 103

The Examiner has rejected Claims 1-20 under 35 U.S.C. § 103(a) as being obvious over Geiger et al., "Influence of Sulphur on the Formation of Dioxin/Furan during Sewage Sludge Incineration (English Translation)" in view of U.S. Patent No. 6,436,868 to Imai et al. and further in view of Japanese patent document 11-33343. The rejection should be withdrawn in view of the remarks below.

It is well established that to establish a *prima facie* case of obviousness, the USPTO must satisfy all of the following requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the proposed modification must have had a reasonable expectation of success, as determined from the vantage point of one of ordinary skill in the art at the time the invention was made. *Amgen v.*

Chugai Pharmaceutical Co. 18 USPQ 2d 1016, 1023 (Fed. Cir. 1991), *cert. denied* 502 U.S. 856 (1991). Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496, (CCPA 1970). No *prima facie* case of obviousness has been established according to these criteria.

The present invention is based on the surprising discovery that, by practicing a specific combination of steps in a specified order, the formation of dioxins ordinarily produced in disposal processes, e.g., thermal disposal processes, can be substantially reduced, and dioxin emissions can also be diminished to very low levels. Surprisingly, the process includes the addition of an adsorbent to a gaseous medium which has already been subjected to an ash removal process.

More particularly, Applicants' invention relates to a method that involves (a) adding sulfur, or another halogenation suppressant, or mixtures thereof to a composition containing dioxin precursors, (b) incinerating the composition containing dioxin precursors, thereby forming a gaseous medium, (c) reducing heat in the gaseous medium formed in step (b), (d) removing ash from the gaseous medium, (e) adding an adsorbent to the gaseous medium formed in step (d), and (f) removing acid gases and particulates from the gaseous medium formed in step (e).

Geiger teaches the influence of sulfur on the formation of dioxin/furan during the incineration of sewage sludge, domestic refuse and special refuse. In a fluidized bed oven, the sludge is dried, crushed and incinerated. Inert components (ash) are drained out with the waste gas. The waste gases are then purified by removing dust, sulfur dioxide, hydrogen chloride and heavy metal in electrofilters and a waste gas rinsing apparatus. However, Geiger does not disclose removing the ash from the gaseous medium, adding an absorbent, and removing acid gases and particulates.

Geiger does not provide a motivation to modify the method taught, practice the claimed invention, and obtain the results obtained by Applicants. Geiger fails to provide any teaching leading to an expectation that removing ash from the gaseous medium, adding an adsorbent to the gaseous medium thus formed, and removing

acid gases and particulates from the mixture of gaseous medium and adsorbent thus formed would produce the results Applicants have obtained.

Imai does not overcome the deficiencies of Geiger. Imai teaches the use of composite catalyst, including activated carbon, on incinerator exhaust gas between a point subsequent to the combustion chamber and the dust collector. Imai does not teach the removal of ash from the gaseous medium at a point before the addition of the composite catalyst. In addition, Imai does not teach using the composite catalyst containing activated carbon to absorb the dioxin or dioxin precursors but rather to inhibit the formation of dioxins by injecting the carbon before the fly ash collector. Because Geiger and Imai are directed to the reduction of dioxin and furan formation, Geiger and Imai provide no motivation towards modification, practice of the present invention, and obtaining the results of the present invention. The teachings of the prevention of formation of dioxin and furan does not teach or suggest their removal.

JP 11-03343 does not overcome the deficiencies of Geiger and Imai. JP 11-03343 teaches the use of a blowing agent, containing activated carbon, into an incinerator flue gas. However, JP 11-03343 teaches the processing of a gas stream that contains soot dust, and the maintenance of the pH thereof. The flue gas of JP 11-03343 is equivalent to that of Geiger and Imai in that it has not been subjected to the removal of ash before the addition of the catalyst or activated carbon. None of Geiger, Imai or JP 11-03343 provides motivation towards modification, practice of the present invention, and obtaining the results of the present invention. The teachings of processing a gas stream containing soot or ash does not suggest processing a gas stream from which the soot or ash has been removed.

The combination of references proposed by the Examiner does not contain a motivation for one skilled in the art to produce Applicants' invention. Geiger, Imai and JP 11-03343 do not contain, alone or in combination, all of the limitations of the pending claims. For these reasons, the reversal of the rejection of Claims 1-20 over Geiger in view of Imai and further in view of JP 11-33343 is respectfully requested.

The Examiner has rejected Claims 1-20 under 35 U.S.C. § 103(a) as being

obvious over Geiger et al. in view of Imai and further in view of Japanese patent document 05-031323. The Examiner cites Geiger and Imai for the teachings referred to in the previous rejection.

The Examiner cites JP 05-031323 for teaching the spraying of powdered activated carbon into an exhaust gas line subsequent to an incinerator, and the cooling of the exhaust gas to 120 to 200 C before treatment. However, JP 05-031323 teaches that activated carbon (1) and an absorbent for acidic-component removal (2) may be added in either order or together (Figs. 1, 2 and 3), but in all cases the spraying of powdered activated carbon takes place before dust removal (3). The flue gas of JP 05-031323 is equivalent to that of Geiger and Imai in that it has not been subjected to the removal of ash before the addition of the catalyst or activated carbon. JP 05-031323 does not provide any teaching of (d) removing ash from the gaseous medium, (e) adding activated powder to the gaseous medium formed in step (d) at a rate that is at least about 0.0007 kg, per about 100 m³ of gaseous medium, and (f) removing acid gases and particulates from the gaseous medium formed in step (e), and does not remedy the lack of these elements in Geiger and Imai. None of Geiger, Imai or JP 05-031323 provides motivation towards modification, practice of the present invention, and obtaining the results of the present invention. The teachings of processing a gas stream containing soot or ash does not suggest processing a gas stream from which the soot or ash has been removed.

The combination of references proposed by the Examiner does not contain a motivation for one skilled in the art to produce Applicants' invention. Geiger, Imai and JP 05-031323 do not contain, alone or in combination, all of the limitations of the pending claims. For these reasons, the reversal of the rejection of claims 1-20 over Geiger et al. in view of Imai and further in view of Japanese patent document 05-031323 is respectfully requested.

CONCLUSION

Applicants have amended Claims 1, 13 and 15. Attached hereto please find pages captioned "Version with markings to show changes made."

Applicants submit that the present application is in condition for allowance. Accordingly, reconsideration and a Notice of Allowance are respectfully requested for Claims 1-20. If the Examiner is of the opinion that the present application is in condition for other than allowance, he is requested to contact the Applicants' attorney at the telephone number given below so that additional changes to the claims may be discussed.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend the claims as follows:

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1. (Amended) A method comprising the steps of:
 - (a) adding sulfur, or another halogenation suppressant, or mixtures thereof to a composition containing dioxin precursors,
 - (b) incinerating the composition containing dioxin precursors, thereby forming a gaseous medium,
 - (c) reducing heat in the gaseous medium formed in step (b),
 - (d) removing ash from the gaseous medium,
 - (e) adding an adsorbent to the gaseous medium formed in step (d), and
 - (f) removing acid gases and particulates from the gaseous medium formed in step (e).

13. (Amended) The method of claim [1] 4, wherein the chlorinated solvents are selected from the group consisting of dichloromethane, monochlorobenzene, dichlorobenzene, 1,1-dichloroethane and methylene chloride.

15. (Amended) A method comprising the steps of:
 - (a) adding sulfur, or another halogenation suppressant, or mixtures thereof to a composition containing dioxin precursors that comprises at least one selected from the group consisting of (i) a wastewater treatment sludge (ii) solid organic residues and (iii) a mixture of halogenated solvents,
 - (b) incinerating the composition containing dioxin precursors at a temperature that is at least about 800°C, thereby forming a gaseous medium,

- (c) reducing heat in the gaseous medium formed in step (b) to a temperature that is below about 200°C,
- (d) removing ash from the gaseous medium,
- (e) adding activated powder to the gaseous medium formed in step (d) at a rate that is at least about 0.0007 kg, per about 100 m³ of gaseous medium,
- (f) removing acid gases and particulates from the gaseous medium formed in step (e).